

THE INFLUENCE OF FERTILIZER ON ANALYZED SOYBEAN VARIETIES

Neag Narcisa Paula, Marcel Matei Duda, Gocan Tincuța*, Teodora Morar, Alina Mornea Petrache

¹University of Agricultural Sciences and Veterinary Medicine, Faculty of Horticulture
3-5 Mănăstur St., 400372 Cluj-Napoca, Romania,

* corresponding author gocantincutza@yahoo.com

Abstract. The major role that soybeans may have in perspective is also related to the plant's attribution to fix the nitrogen in the atmosphere and to use it with high yield in the process of assimilation. To study the link between the quality characteristics considered in the three soybean varieties it was used the calculation of the correlation coefficients (r). The study of the existing links between the analysed characters is of great utility in the production by allowing the selection that simultaneously holds the combination of useful characters, but at the same time draws attention to the difficulty of achieving these requirements.

Keywords: soybean, pod, correlation, variety, fertilization

INTRODUCTION

Soybean [*Glycine max* (L.) Merrill] is considered to be the "plant of the future", not only for its important nutritional value and benefits for human health, but also for animal feed and industrial applications (Singhet *al.* 2010). Soybean is ranked first in terms of importance in the group of grain legumes, not only because of its high protein content, but as well for its fat, lecithin, vitamins and enzymes contained. Thus, making it difficult to find another plant capable to synthesize such a large amount of valuable substances in such a short interval. Soybean is the most economical source of protein in the world, and soybean oil is the second most consumed vegetable oil after palm oil. Soybean has an insignificant amount of saturated fat, has no cholesterol and is rich in monosaturated and polysaturated acids. They also contain tocopherols, members of the vitamin E family (Thoenes, 2006).

Soybeans have a high content of protein (33-49%), fats (15-26%), non-nitrate extractive substances (13-24%), lecithin (1.6-2.5%), B vitamins (B1-thiamine, B2-riboflavin, B6-pyridoxine), as well as enzymes like lipoxidase, lipase, urease, amylase (Giosan *et al.*, 1986). It is widely recognized that predominant factors affecting the bioactive substance content of soybeans are genotype, environmental conditions, applied technology or a combination of them. Taller plants are more likely to produce a larger number of branches and number of crops per plant (Chand, 1999; Rajanna *et al.*, 2000).

MATERIAL AND METHODS

Quality is a complex attribute, determined by a large number of factors, each with a specific contribution.

In this experiment the factors were:

Factor A (variety)

- a1. Onix 200 kg (Mt in network ISTIS);
- a2. Felix 3600 kg;
- a3. Cristina 10 kg.

Factor B (cultivation density: 60 b.g./mp)

- b1. 25 cm between rows X 6.67 cm between plants per row (with SUP 2);
 b2. 45 cm between row X 3.7 cm between plants per row (with SPC 8).

Factor C (fertilization)

- c1. basic fertilization (N68,25 P46) (Mt);
 c2. basic fertilization + (N6,7 P6 K4,2 + oligoelements, from the Fertitel product);
 c3. basic fertilization + (N19 P19 K19 + Mg + microelements from the Agro-Feed product).

The analysis of the degree of association between the different characters tracked was achieved by calculating the correlation coefficients. For the accurate description of the relationship between the different characters studied, the linear regression analysis was used. This was realised using the STATISTICA 10 program.

RESULTS AND DISCUSSION

For the Onix variety using basic fertilization (Fig. 1), the two characters followed by the correlation coefficient $r = -,0562$ are not statistically assured.

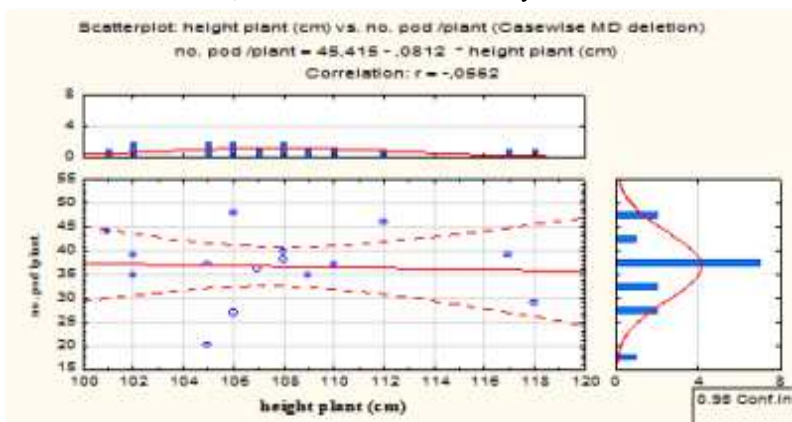


Figure 1. Onix variety- basic fertilization

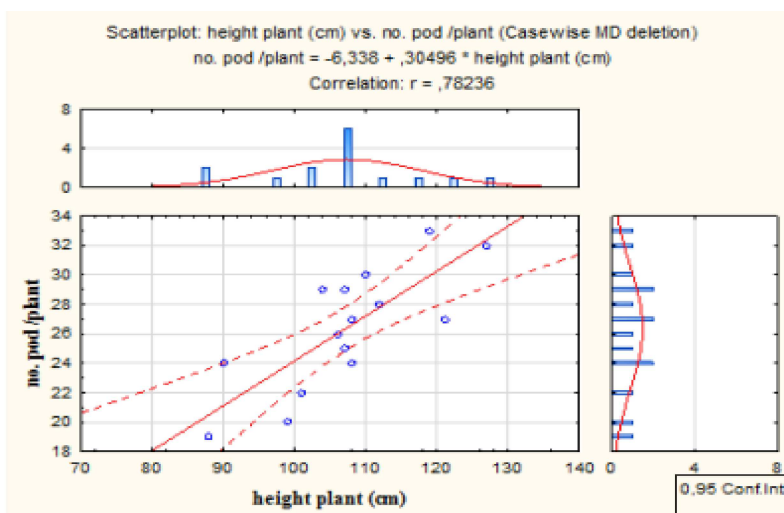


Figure 2. Onix variety - basic fertilization + (N6,7 P6 K4,2 + oligoelements, from the Fertitel product)

Based on the calculations of the correlation coefficient between the plant height and the number of pods on the plant the value $r = ,78236$ was obtained, being very significant for the Onix variety - basic fertilization + (N6,7 P6 K4,2 + oligoelements, from the Fertitel product). This value was compared with the correlation coefficient with the probability of 5% and respectively 1%. $r = 0.95 > 0.50$ and 0.80 . Based on these comparisons, it can be stated that between these characters the correlation coefficient is very significant positive, indicating a close connection.

Fig. 3 is a graphical representation of the relationship between the plant's height and the number of pods on the plant in the variant Onix variety - basic fertilization + (N19 P19 K19 + Mg + microelements from the Agro-Feed product). The correlation coefficient, with $r = ,61784$ ** indicates the existence of a distinct positive relationship.

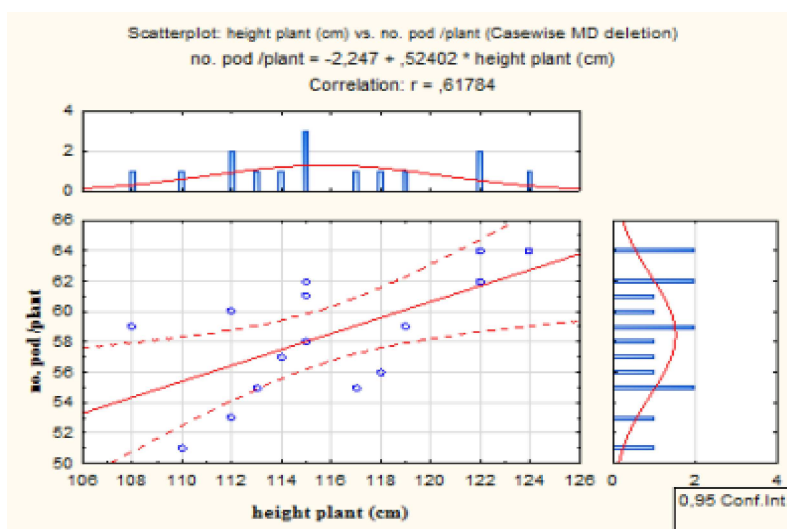


Figure 3. Onix variety - basic fertilization + (N19 P19 K19 + Mg + microelements from the Agro-Feed product)

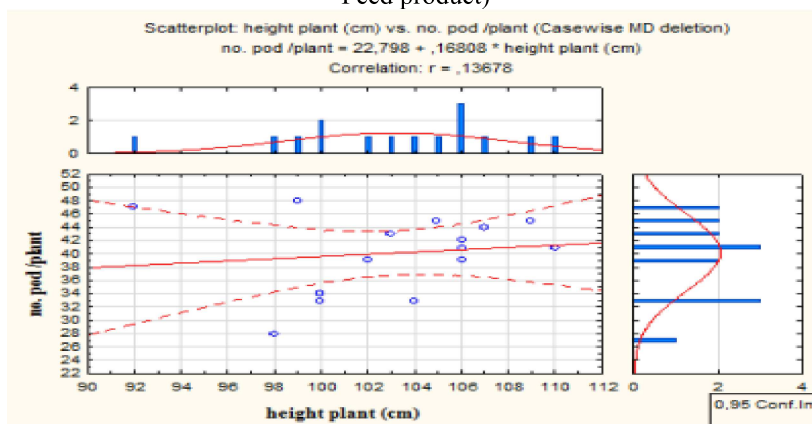


Figure 4. Felix variety - basic fertilization

The experimental results for Felix variety with basic fertilization were also graphically represented (Fig. 4) showing the relationship between the two characters estimated by simple linear regression, the value of the coefficient of determination $r = ,13678$. Based on these comparisons it can be stated that between the plant's height and the

number of pods on the plant in this variant there are no differences and are not statistically ensured, even if they have grown compared to the same variant in the Onix variety.

Graphically represented the relationship between plant's height and the number of pods on the plant in the Felix variety - basic fertilization + (N6,7 P6 K4,2 + oligoelements, from the Fertitel product), with the correlation coefficient $r = ,50033$ **, indicates the existence of a distinct significantly positive relationships (Fig. 5).

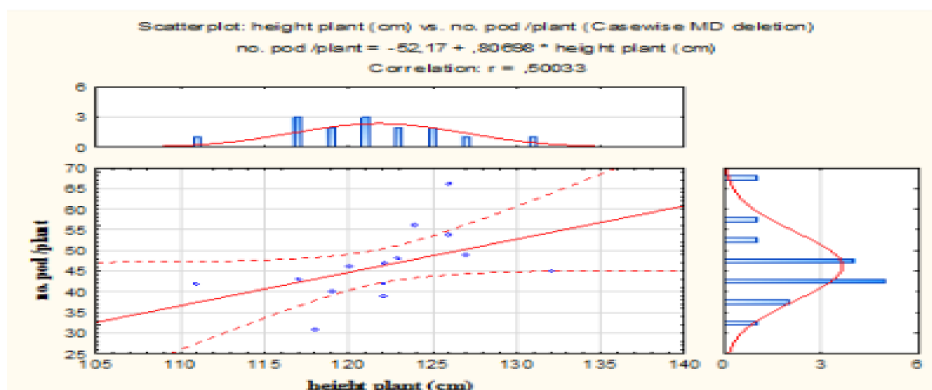


Figure 5. Felix variety - basic fertilization + (N6,7 P6 K4,2 + oligoelements, from the Fertitel product)

Fig.6 is a graphical representation of the relationship between the plant's height and the number of pods on the plant in the Felix variety - basic fertilization + (N19 P19 K19 + Mg + microelements from the Agro-Feed product). The correlation coefficient with $r = ,34743$ ** indicates the existence of a significantly positive relationship.

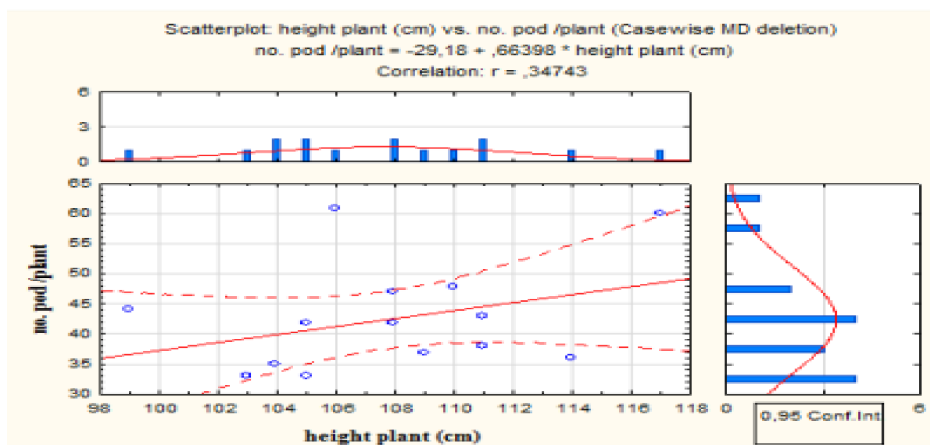


Figure 6. Felix variety - basic fertilization + (N19 P19 K19 + Mg + microelements from the Agro-Feed product)

The chart presented in Fig. 7, where the experimental variant is represented by the Cristina variety - basic fertilization, shows based on the correlation index with the value of $r = ,52460$ ** a distinctly significant relationship between the two characters followed, namely the height of the plants and the number of pods on the plant.

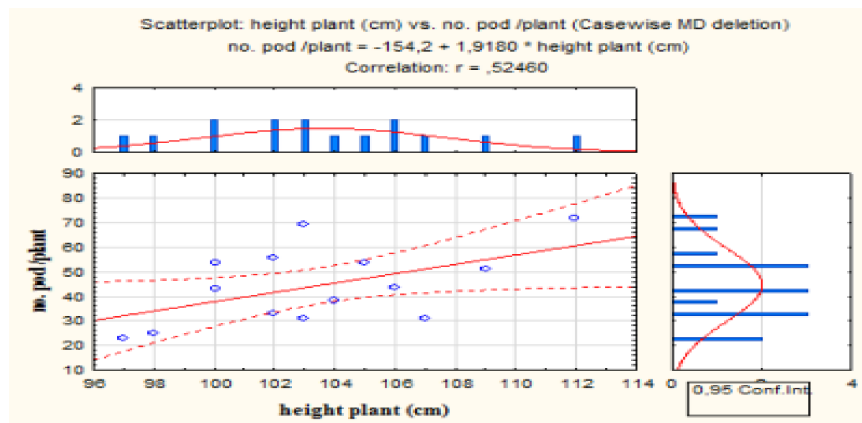


Figure 7. Cristina variety - basic fertilization

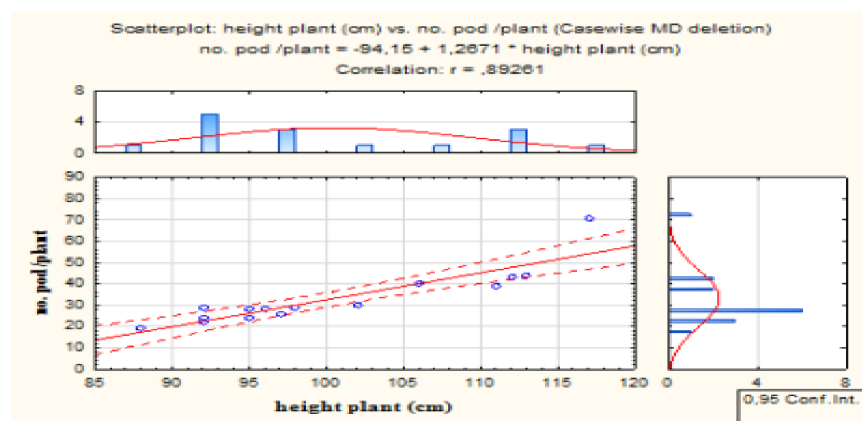


Figure 8. Cristina variety - - basic fertilization + (N6,7 P6 K4,2 + oligoelements, from the Fertitel product)

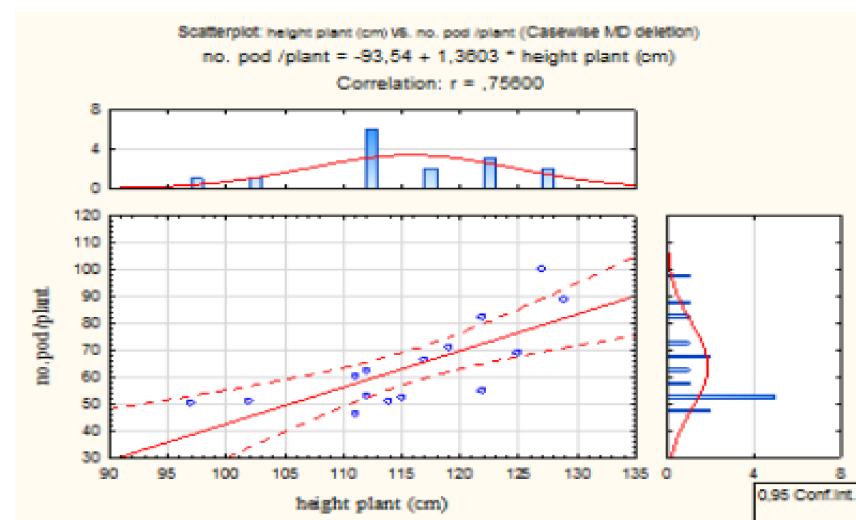


Figure 9. Cristina variety - basic fertilization + (N19 P19 K19 + Mg + microelements from the Agro-Feed product)

In the case of the variant Cristina variety - basic fertilization + (N6,7 P6 K4,2 + oligoelements, from the Fertitel product), the correlation coefficient has the value of $r = 0,89261$, (Fig. 8). This value was compared with the coefficient of correlation with probability 5% and respectively 1%. $r = 0,95 > 0,50$ and $0,80$. Based on these comparisons it can be stated that between the height of the plants and the number of pods on the plant the correlation coefficient is very significant positive, indicating a close connection.

The experimental results for Cristina variety - basic fertilization + (N19 P19 K19 + Mg + microelements from the Agro-Feed product) closely follow the right of regression. The relation between the two characters estimated by the simple linear regression is illustrated by the following equation of degree I: $y = 93,54 + 1,3603 \cdot \text{height plant}$, and the value of the coefficient of determination $r^2 = 0,75600$. Based on these comparisons, it can be stated that between the quantity of dry substance and β -glucan the correlation coefficient is very significant.

CONCLUSIONS

The Cristina variety recorded the highest values regardless of the fertilization variant used. Correlation right had distinct and very significant values in this variety. On the last place is the Onix variety.

Regarding fertilization, all three varieties behaved best in case of c2 basic fertilization + (N6,7 P6 K4,2 + oligoelements, from the Fertitel product). It can be argued that the two fertilizations lead to the increase of the correlation coefficient, so it is beneficial for the soybean culture.

REFERENCES

1. Chand, P., 1999, Association analysis of yield and its components in soybean (*Glycine max* L.) Merrill. *Madras Agric. J.*, 86 (7-9): 378-381.
2. Giosan N., I. Nicolae, Gh. Sin, 1986, Soia, Editua Academiei RSR, București;
3. Rajanna, M.P., S.R. Viswanatha, R.S. Kulkarni and S. Ramesh, 2000, Correlation and path analysis in soybean [*Glycine max* (L.) Merrill]. *Crop Research Hisar.*, 20(2): 244-247.
4. Singh A V, Shah S and Prasad B, 2010, Effect of phosphate solubilizing bacteria on plant growth promotion and nodulation in soybean (*Glycine max* L. Merrill). *J Hill Agric* 1:35-39.